Panel joint.

The present invention relates to a panel joint comprising friction enhancing means intended for impeding assembled panels from sliding in a direction along the edges.

Prefabricated floor panels provided with tongue and groove at the edges are quite common nowadays. These can be installed by the average handy man as they are very easy to install. Such floors can, for example, be constituted of solid wood, fibre board or particle board. These are most often provided with a surface layer such as lacquer, or some kind of laminate. The panels are most often installed by being glued via tongue and groove. The most common types of tongue and groove are however burdened with the disadvantage to form gaps of varying width between the floor panels in cases where the installer hasn't been thorough enough. Dirt will easily collect in such gaps. Moisture will furthermore enter the gaps which will cause the core to expand in cases where it is made of wood, fibre board or particle board, which usually is the case. The expansion will cause the surface layer to rise closest to the edges of the joint which radically reduces the useful life of the floor since the surface layer will be exposed to an exceptional wear. Different types of tensioning devices, forcing the floor panels together during installation can be used to avoid such gaps. This operation is however more or less awkward. It is therefore desirable to achieve a joint which is self-guiding and thereby automatically finds the correct position. Such a joint would also be possible to utilise in floors where no glue is to be used.

Such a joint is known through WO 94/26999 which deals with a system to join two floor panels. The floor panels are provided with a locking device at the rear sides. In one embodiment the floor panels are provided with profiles on the lower side at a first long side and short side. These profiles, which extends outside the floor panel itself, is provided with an upwards directed lip which fits into grooves on the lower side of a corresponding floor panel. These grooves are arranged on the second short side and long side of this floor panel. The floor panels are furthermore provided with a traditional tongue and groove on the edges. The intentions are that the profiles shall bend downwards and then to snap back into

the groove when assembled. The profiles are integrated with the floor panels through folding or alternatively, through gluing.

According to WO 94/26999, the floor panels may be joined by turning or prizing it into position with the long side edge as a pivot point. It is then necessary to slide the floor panel longitudinally so that it snaps into the floor panel previously installed in the same row. A play is essential in order to achieve that. This play seems to be marked Δ in the figures. A tolerance of ±0.2mm is mentioned in the application. Such a play will naturally cause undesired gaps between the floor panels. Dirt and moisture can penetrate into these gaps.

It is also known through WO 97/47834 to manufacture a joint where the floor panels are joined by turning or prizing it into position with the long side edge as a pivot point. According to this invention a traditional tongue has been provided with heel on the lower side. The heel has a counterpart in a recess in the groove of the opposite side of the floor panel. The lower cheek of the groove will be bent away during the assembly and will then snap back when the floor panel is in the correct position. The snap-joining parts, i.e. the tongue and groove, is in opposite to the invention according to WO 94/26999 above, where they are constituted by separate parts, seems to be manufactured monolithically from the core of the floor panel. WO 97/47834 does also show how the tongue and groove with heels and recesses according to the invention is tooled by means of cutting machining. This invention does also have the disadvantage that the best mode of joining floor panels includes longitudinal sliding for joining the short sides of the floor panels, which also here will require a play which will cause unwanted gaps between the floor panels. Dirt and moisture can penetrate into these gaps.

It is also known through WO 01/75247 to manufacture a panel having joining members intended for turning assembly on two opposite edges while the remaining edges are provided with joining members which are intended to be joined through vertical motion. According to the WO 01/75247 invention it has been made possible to achieve a panel where the fit can be made very tight since no sliding motion along two joined edges is needed in order to join the adjacent edge, as is the case with the teachings of WO 97/47834 and WO 94/26999 above. It has

showed advantageous to apply the turning type joint on the long side while the vertical assembly type joint is applied on the short sides. The strength of the joint on the short side edges may, in fact, be improved by an improved friction on the long side edge, which will give the designer more room for improvements on assembly properties of the short side joint.

Yet another floor panel is known from WO 00/63510 which seems to be intended to be assembled in a manner similar to WO 01/75247 above.

There is always a great need to improve joint strength on panel systems as there may be considerable strain especially on floors made of wood based materials due to the fact that changes in moisture levels over the year will cause changes in format. It is also known that the installation of the above identified panels will cause movement between already installed panels. This movement is caused by the pushing, knocking and/or sliding action used when installing the panels. Certain types of panels, for example tiles, are intended to have both lateral and longitudinal joints aligned over a larger surface. It is very easy to disturb this alignment during the installation with known types of panels.

It is, through the present invention, made possible to radically improve joint strength whereby an improved panel joint has been achieved. Accordingly, the invention relates to a panel joint for positioning and holding panels together via their respective edges in order to form a surface comprising a plurality of said panels assembled together. The edges of said panels are provided with a core and means for mechanically locking said panels towards one another via interacting locking surfaces. The invention is characterised in that said edges further comprises friction enhancing means intended for impeding assembled panels from sliding in a direction along the edges. This friction enhancing means will show its greatest effect when arranged on the long sides of rectangular panels and will radically reduce the stress on the short side edge joints of these panels. It is according to different embodiments of the invention also possible to arrange the friction enhancing means on other sides of panels as well. The panels may also be square shaped or any other shape that may be used for panels.

It is according to different embodiments according to the invention possible to achieve different friction coefficients it is however highly desired that the force needed to overcome the static friction along the joint between two assembled panels is larger than 100N per meter of joint length, preferably larger than 1000N per meter of joint length.

According to a first embodiment of a panel joint according to the invention predetermined surfaces of the edge are provided with a rough surface. This rough surface may be achieved by wetting the predetermined surfaces of the edge with a liquid in cases where the core selected for the manufacturing of the panels is made of a wood based material. The liquid will here cause the fibre of the core to rise. In order to increase the stability of the fibre rising it is advantageous to use a liquid which comprises a binding agent as for example a lacquer of some kind.

According to another embodiment of the invention predetermined surfaces of the edge is coated with a high friction polymer. This high friction polymer may be a natural rubber or a synthetic rubber. As examples of suitable rubber materials can be mentioned; silicon rubber, latex based rubber, ethylene-propylene-diene-terpolymer rubber, ethylene-propylene-copolymer rubber, styrene-butadiene rubber and acrylic co-polymer dispersions.

According to another embodiment of the invention predetermined surfaces of the edge are provided with a rough surface. This rough surface is comprised by particles bonded to the predetermined surfaces of the edges. The particles suitably have a size in the range 50 μm to 2 mm. It is also suitable if the particles have a higher hardness index than the material of the core. A natural choice of particles for this purpose would be minerals like sand or the like and it is indeed advantageous if the particles are irregular and have sharp edges as more rounded particles could act as a ball bearing. However, if spherical particles are properly forced into the core material during the assembly they might work as well. Irregular particles having sharp edges will in any case require a lower assembly pressure in order to obtain the same friction effect and is therefore preferred. It is, besides minerals, also possible to use particles made of polymeric materials as long as they have a higher hardness index than the core material. Among such

suitable materials can be mentioned; styrene, acrylic, high density polyethylene, polypropylene, polycarbonate, phenolic resins and melamine resins. These materials may also contain fillers like cellulose, talcum or mica. The sharp edges of these polymeric particles are advantageously achieved by grinding and therefore scrap material is a suitable source. Another advantage with polymeric materials is that they won't dull the edges of tools used for cutting the panels having the edges herein described to the same extent mineral particles like sand would.

According to yet another embodiment of the invention predetermined surfaces of the edges is provided with splines. These splines are arranged at an angle towards the extension of the edge of the panel.

According to yet another embodiment of the invention a jagged profile is arranged between predetermined surfaces of the edges. This profile may be made of metal, thermoplastic material or of thermosetting material. Like with the particles previously discussed there may be advantages in selecting materials that don't blunt tools used during assembly of the panels. It is however possible to use smaller lengths of jagged edge profiles made of metal which are put into the joints just before the assembly. This way the friction enhancing device can be arranged only at critical locations identified by the installer.

The panels according to the present invention comprises a core. The core is most often comprised of particles or fibre of wood bonded with resin or glue. It is advantageous to coat the surface closest to the joint in cases where the floor will be exposed to high levels of moisture since the cellulose based material is sensitive to moisture. This coating may suitably incorporate resin, wax or some kind of lacquer. The panels suitably comprises an upper decorative layer which may be constituted of a decorative paper impregnated with melamine-formaldehyde resin. One or more so called overlay sheets of α-celluloce, impregnated with melamine-formaldehyde resin may possibly be placed on top of the decorative layer. The abrasion resistance may be improved by sprinkling one or more of the sheets with hard particles of for example α-aluminium oxide,

silicon carbide or silicon oxide. It is also possible to coat the upper surface with lacquer or some kind of thermoplastic foil. The lower side may suitably be coated with lacquer or a layer of paper and resin.

The invention is not limited by the embodiments shown since they can be varied within the scope if the invention.